

3600.2406
January 6, 2005 (1:19pm)

Docket: AM-2406

Amendments to the claims

1 – 20. (Canceled)

21. (Previously presented) An apparatus for depositing a magnetic film, comprising:
a sputtering chamber containing a target comprising a magnetic sputtering material, a substrate support having a substrate surface that is separated from the target, and a grounded collimator positioned between the target and the substrate support; and
an annular magnet array disposed within the sputtering chamber, the annular magnet array being configured to form a magnetic field that is substantially parallel to the substrate surface of the substrate support, the annular magnet array being concentrically positioned around an outer perimeter of the substrate surface of the substrate support.

22. (Previously presented) The apparatus of claim 21, wherein the target comprises a material that retains magnetic properties when deposited on the surface of a substrate.

23. (Previously presented) The apparatus of claim 23, wherein the target is separated from the substrate support by a distance of at least 50 mm.

24. (Previously presented) The apparatus of claim 21, wherein the annular magnet array comprises a plurality of magnetic segments positioned in an annular configuration around the perimeter of the substrate support, the plurality of magnetic segments having different magnetic orientations that cooperatively combined to magnetic field that is parallel to the substrate surface.

25. (Previously presented) The apparatus of claim 23, wherein the target comprises a nickel/iron alloy.

3600.2406
January 6, 2005 (1:19pm)

Docket: AM-2406

26. (Previously presented) The apparatus of claim 21 wherein the target and the substrate supporting surface are separated by a distance of at least 50 mm.

27. (Previously presented) A method for depositing a magnetic film within a sputtering chamber containing a target and a substrate, comprising:

sputtering the target onto a surface of the substrate at a pressure less than about 15 mTorr;

collimating sputtering of the target with a grounded collimator disposed between the target and the substrate; and

generating a static magnetic field that is substantially parallel to the surface of the substrate during sputtering using a stationary annular magnet array concentrically disposed around a perimeter of the surface of the substrate within the sputtering chamber.

28. (Previously presented) The method of claim 27, wherein the sputtering occurs at a chamber pressure less than about 5 mTorr.

29. (Previously presented) The method of claim 27, wherein the target and the surface of the substrate are maintained at a distance of at least 50 mm during sputtering.

30. (Previously presented) The method of claim 29, wherein the target comprises a Ni/Fe alloy.

31. (Previously presented) A method for depositing a magnetic film within a sputtering chamber containing a target and a substrate, comprising:

sputtering the target onto a surface of the substrate at a pressure less than about 15 mTorr;

collimating sputtering of the target with a grounded collimator disposed between the

3600.2406
January 6, 2005 (1:19pm)

Docket: AM-2406

target and the substrate;

generating a target magnetic field from a magnetron positioned in back of said target with respect to substrate; and

wherein the grounded collimator removes charges from target particles and reduces interference between the target magnetic field and the static magnetic field which is substantially parallel to the surface of the substrate.

32. (Previously presented) The apparatus of claim 21, wherein said magnetic field at said substrate surface is substantially parallel to said substrate surface.

33. (Previously presented) The apparatus of claim 21, wherein said annular magnet array comprises a plurality of permanent magnets.

34. (Previously presented) The apparatus of claim 33, wherein said plurality of permanent magnets are magnetized parallel to a plane of said substrate surface

35. (Previously presented) The apparatus of claim 21, wherein said annular magnet array is a Halbach array.

36. (Previously presented) The method of claim 27 wherein said target comprises a material that is magnetic when sputter deposited in a substantially parallel magnetic field.

37. (Previously presented) The method of claim 27, wherein said annular magnet array comprises an array of permanent magnets magnetized parallel to a plane of the surface of the substrate during sputtering.

38. (Previously presented) The method of claim 27, wherein said annular magnet array

3600.2406
January 6, 2005 (1:19pm)

Docket: AM-2406

comprises a Halbach array.

39. (Previously presented) The method of claim 27, wherein said magnetic field at the surface of the substrate is substantially parallel to the surface of said substrate.

40. (Previously presented) The method of claim 27, wherein the substrate is processed to form a magnetic recording head.

41. (Previously presented) An apparatus for depositing a magnetic film, comprising:
a sputtering chamber configured to receive a sputtering target for sputter depositing a magnetically alignable material onto a substrate supported on a support surface in opposition to said target along an axial direction; and

a stationary annular array of permanent magnets surrounding an outer periphery of said support surface and continuously extending from one side to the other side of said support surface parallel to said central axis and creating a magnetic field extending horizontally along said support surface.

42. (Previously presented) The apparatus of claim 41, wherein said array is a Halbach array.

43. (Previously presented) The apparatus of claim 41, further comprising a grounded collimator positioned between said target and said support surface.

44. (Previously presented) The apparatus of claim 41, wherein said material comprises nickel and iron.

45. (Previously presented) The apparatus of claim 21, wherein said annular magnet array

3600.2406
January 6, 2005 (1:19pm)

Docket: AM-2406

is stationary and produces a static magnetic field.

46. (Previously presented) The apparatus of claim 21, further comprising a magnetron disposed on a side of said target opposite said substrate surface of said substrate support.

47. (Previously presented) The method of claim 27, further comprising generating a target magnetic field adjacent said target from a magnetron positioned in back of said target with respect to said substrate.

47. (Previously presented) The apparatus of claim 41, further comprising a magnetron disposed on a side of said target opposite said support surface.

48. (Previously presented) A method for depositing a magnetic film within a sputtering chamber containing a target and a substrate support for supporting a circular substrate to be deposited with said magnetic film, comprising:

sputtering the target onto a surface of the substrate; and
generating a static magnetic field that is substantially parallel to the surface of the substrate during sputtering using a stationary annular magnet array concentrically disposed around a perimeter of the surface of the substrate within the sputtering chamber.

49. (Previously presented) The method of claim 48, further comprising collimating sputtering of the target with a grounded collimator disposed between the target and the substrate.

50. (Previously presented) The method of claim 48, further comprising generating a target magnetic field from a magnetron positioned in back of said target with respect to said substrate support.

3600.2406
January 6, 2005 (1:19pm)

Docket: AM-2406

51. (New) The apparatus of claim 21, wherein said substantially parallel magnetic field extends along said substrate surface.

52. (New) The method of claim 27, wherein said substantially parallel static magnetic field extends along said surface of said substrate.

53. (New) The apparatus of claim 48, wherein said substantially parallel static magnetic field extends along said surface of said substrate.